# 155 Mbps Bi-directional Receptacle Single Fiber Transceiver

## B-15/13-155-TDFB(3)-SSCx-40

**Features**

- Diplexer Single Mode Single Fiber 1x9 SC Receptacle Connector
- Wavelength Tx 1550 nm/Rx 1310 nm
- SONET OC-3 SDH STM-1 Compliant
- Single +5V power Supply
- Single +3.3V power Supply
- PECL/LVPECL Differential Inputs and Outputs [B-15/13-155-TDFB(3)-SSCx-40]
- Wave Solderable and Aqueous Washable
- LED Multisourced 1x9 Transceiver Interchangeable
- Class 1 Laser Int. Safety Standard IEC 825 Compliant
- Uncooled Laser diode with MQW structure DFB Laser
- Complies with Telcordia (Bellcore) GR-468-CORE
- RoHS compliant

### Absolute Maximum Rating

| Parameter | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Power Supply Voltage | $V_{cc}$ | 0 | 6 | V | B-15/13-155-TDFB-SSCx-40 |
| Power Supply Voltage | $V_{cc}$ | 0 | 3.6 | V | B-15/13-155-TDFB3-SSCx-40 |
| Output Current | $I_{out}$ | - | 30 | mA | |
| Soldering Temperature | - | - | 260 | °C | 10 seconds on leads only |
| Storage Temperature | $T_{stg}$ | -40 | 85 | °C | |

### Recommended Operating Condition

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | $V_{cc}$ | 4.75 | 5 | 5.25 | V |
| Power Supply Voltage | $V_{cc}$ | 3.1 | 3.3 | 3.5 | V |
| Operating Temperature (Case) | $T_{opr}$ | 0 | - | 70 | °C |
| Data Rate | - | - | 155 | - | Mbps |

### Transmitter Specifications

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| **Optical** | | | | | | |
| Optical Transmit Power | $P_o$ | -5 | - | 0 | dBm | Output power is coupled into a 9/125 µm single mode fiber , B-15/13-155-TDFB(3)-SSC5-40 |
| Optical Transmit Power | $P_o$ | -3 | - | +3 | dBm | Output power is coupled into a 9/125 µm single mode fiber , B-15/13-155-TDFB(3)-SSC7-40 |
| Output center Wavelength | λ | 1480 | 1550 | 1580 | nm | |
| Output Spectrumt Width | Δλ | - | - | 1 | nm | -20dB width |
| Side Mode Suppression Ratio | Sr | 30 | 35 | - | dB | CW |
| Extinction Ratio | ER | 10 | - | - | dB | |
| Output Eye | | Compliant with ITU-T recommendation G.957/STM-1 | | | | |
| Optical Rise Time | $t_r$ | - | - | 2 | ns | 10% to 90% Values |
| Optical Fall Time | $t_f$ | - | - | 2 | ns | 10% to 90% Values |
| Optical Isolation | - | 30 | - | - | dB | Isolation potential between 1480-1580nm at least 30dB |
| Relative Intensity Noise | RIN | - | - | -116 | dB/Hz | |
| Total Jitter | TJ | - | - | 1.2 | ns | Measured with $2^{23}$-1 PRBS with 72 ones and 72 zeros. |


20550 Nordhoff St. • Chatsworth, CA 91311 • tel: 818.773.9044 • fax: 818.576.9486
9F, No 81, Shui Lee Rd. • Hsinchu, Taiwan, R.O.C. • tel: 886.3.5169222 • fax: 886.3.5169213

## Transmitter Specifications

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| **Electrical** | | | | | | |
| Power Supply Current | $I_{CC}$ | - | - | 200 | mA | Maximum current is specified at Vcc= Maximum @ maximum temperature |
| Data Input Current-Low | $I_{IL}$ | -350 | - | - | µA | |
| Data Input Current-High | $I_{IH}$ | - | - | 350 | µA | |
| Differential Input Voltage | $V_{IH}$-$V_{IL}$ | 300 | - | - | mV | |
| Data Input Voltage-Low | $V_{IL}$-$V_{CC}$ | -2.0 | - | -1.58 | V | These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs |
| Data Input Voltage-High | $V_{IH}$-$V_{CC}$ | -1.1 | - | -0.74 | V | |

## Receiver Specifications

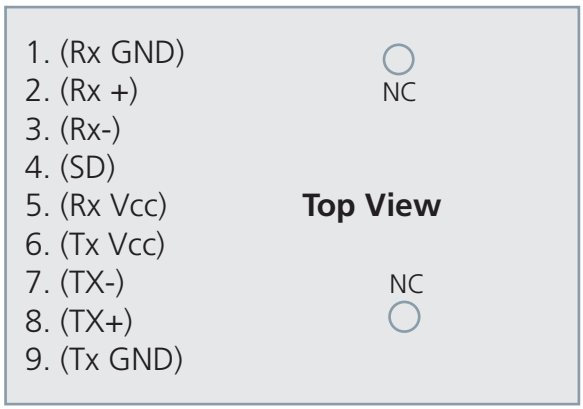
| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| **Optical** | | | | | | |
| Sensitivity | - | - | - | -33 | dBm | Measured with $2^{23}$-1 PRBS, BER = $10^{-10}$, B-15/13-155-TDFB(3)-SSC5-40 |
| Sensitivity | - | - | - | -35 | dBm | Measured with $2^{23}$-1 PRBS, BER = $10^{-10}$, B-15/13-155-TDFB(3)-SSC7-40 |
| Maximum Input Power | $P_{in}$ | -3 | - | - | dBm | |
| Signal Detect-Asserted (Note 1) | Pa | - | - | -33 | dBm | MEasured on transition : low to high, , B-15/13-155-TDFB(3)-SSC5-40 |
| Signal Detect-Asserted (Note 1) | Pa | - | - | -35 | dBm | MEasured on transition : low to high, B-15/13-155-TDFB(3)-SSC7-40 |
| Signal Detect-Deasserted | Pd | -45 | - | - | dBm | Measured on transition: high to low |
| Signal Detect-Hysteresis | | 1.0 | - | 4.0 | dB | |
| Wavelength of Operation | | 1260 | - | 1360 | nm | |

Note 1: Regardless of whether the Tx is on or not, SD should be asserted at less than -33 or -35 dBm of input power level and deasserted at higher than -45 dBm of input power level from the outside Tx.

## Receiver Specifications

| Parameter | Symbol | Min | Typical | Max | Unit | Note |
|---|---|---|---|---|---|---|
| **Electrical** | | | | | | |
| Power Supply Current | $I_{CC}$ | - | - | 100 | mA | The current excludes the output load current |
| Data Output Voltage-Low | $V_{OL}$ -$V_{cc}$ | -2.0 | - | -1.58 | V | These outputs are compatible with 10K, 10KH and 100KECL and PECL outputs |
| Data Output Voltage-High | $V_{OH}$- $V_{cc}$ | -1.1 | - | -0.74 | V | |
| Signal Detect Output Voltage-Low | $V_{SDL}$-$V_{cc}$ | -2.0 | - | -1.58 | V | |
| Signal Detect Output Voltage-High | $V_{SDH}$- $V_{cc}$ | -1.1 | - | -0.74 | V | |

## Connection Diagram



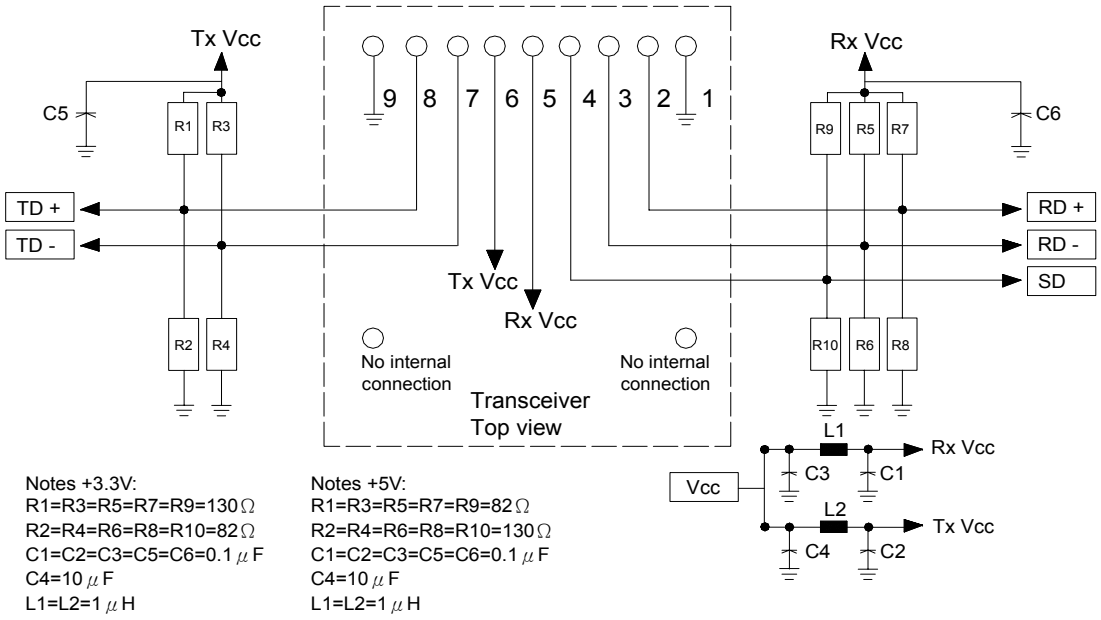

Receiver Signal Ground
Receiver Data Out
Receiver Data Out Bar
Signal Detect
Receiver Power Supply
Transmitter Power Supply
Transmitter Data In Bar
Transmitter Data in
Transmitter Signal Ground

| PIN | Symbol | Notes |
|---|---|---|
| 1 | RxGND | Directly connect this pin to the receiver ground plane |
| 2 | RD+ | See recommended circuit schematic |
| 3 | RD- | See recommended circuit schematic |
| 4 | SD | Active high on this indicates a received optical signal |
| 5 | RxVcc | DC power for the receiver section |
| 6 | TxVcc | DC power for the transmitter section |
| 7 | TD- | See recommended circuit schematic |
| 8 | TD+ | See recommended circuit schematic |
| 9 | TxGND | Directly connect this pin to the transmitter ground plane |


20550 Nordhoff St. • Chatsworth, CA 91311 • tel: 818.773.9044 • fax: 818.576.9486
9F, No 81, Shui Lee Rd. • Hsinchu, Taiwan, R.O.C. • tel: 886.3.5169222 • fax: 886.3.5169213

## Recommended Circuit Schematic (3.3V/5V)

### B-15/13-155-TDFB(3)-SSCx-40



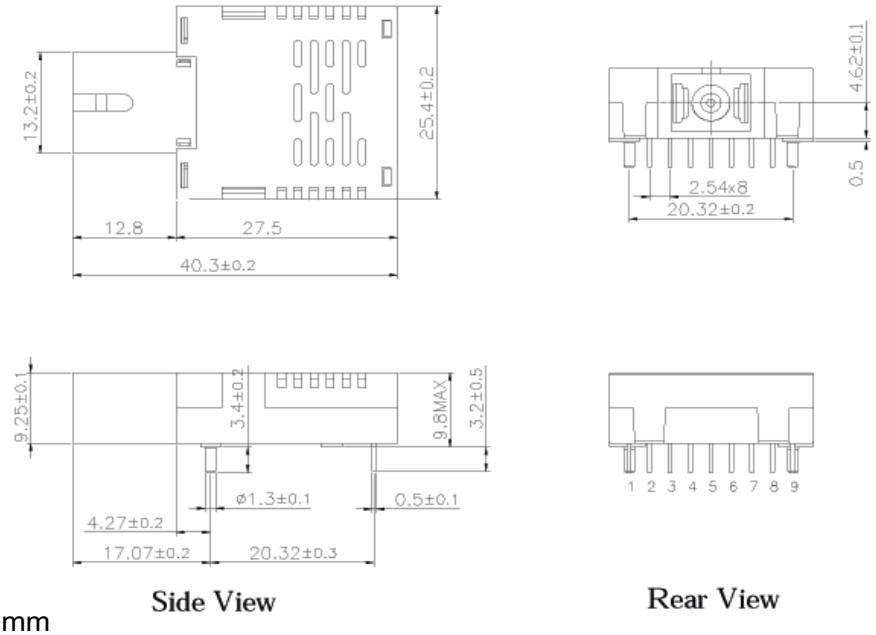

Notes +3.3V:
R1=R3=R5=R7=R9=130Ω
R2=R4=R6=R8=R10=82Ω
C1=C2=C3=C5=C6=0.1μF
C4=10μF
L1=L2=1μH

Notes +5V:
R1=R3=R5=R7=R9=82Ω
R2=R4=R6=R8=R10=130Ω
C1=C2=C3=C5=C6=0.1μF
C4=10μF
L1=L2=1μH

The split-loaded terminations for ECL signals need to be located at the input of devices receiving those ECL signals.
The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc.
A GND plane under the module is required for good EMI and sensitivity performance.

## Package Diagram

### B-15/13-155-TDFB(3)-SSCx-40




Side View

Rear View

Units in mm

## Ordering Information

**Available Options:**

| | |
|---|---|
| B-15/13-155-TDFB-SSC5-40 | B-15/13-155-TDFB-SSC7-40 |
| B-15/13-155-TDFB3-SSC5-40 | B-15/13-155-TDFB3-SSC7-40 |
| B-15/13-155-TDFB-SSC5-40-G5 | B-15/13-155-TDFB-SSC7-40-G5 |
| B-15/13-155-TDFB3-SSC5-40-G5 | B-15/13-155-TDFB3-SSC7-40-G5 |

**Part Numbering Definitions:**

**B - 15/13 - 155 - TDFB(3) - S SC Tx Power -40 -RoHS**

- **Wavelength**
  **Tx Wavelength=1550nm**
  **Rx Wavelength=1310nm**
- **Communication protocol**
  **155 = LVPECL SD output**
- **TDFB = +5V Transceiver**
- **TDFB3 = +3.3V Transceiver**
- **Single mode fiber**
- **Connector options**
  **SC**
- **Tx Power**
  **5 = -5 to 0 dBm**
  **7 = -3 to +2 dBm**
- **-40 = 40.3mm Package**
- **RoHS**
  **Blank = RoHS non-compliant product**
  **G5 = RoHS 5/6-compliant product (lead exemption)**


20550 Nordhoff St. • Chatsworth, CA 91311 • tel: 818.773.9044 • fax: 818.576.9486
9F, No 81, Shui Lee Rd. • Hsinchu, Taiwan, R.O.C. • tel: 886.3.5169222 • fax: 886.3.5169213

## Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

## Legal Notice

**IMPORTANT NOTICE!**
All information contained in this document is subject to change without notice, at LuminentOIC's sole and absolute discretion. LuminentOIC warrants performance of its products to current specifications only in accordance with the company's standard one-year warranty; however, specifications designated as "preliminary" are given to describe components only, and LuminentOIC expressly disclaims any and all warranties for said products, including express, implied, and statutory warranties, warranties of merchantability, fitness for a particular purpose, and non-infringement of proprietary rights. Please refer to the company's Terms and Conditions of Sale for further warranty information.

LuminentOIC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents, services, or intellectual property described herein. No license, either express or implied, is granted under any patent right, copyright, or intellectual property right, and LuminentOIC makes no representations or warranties that the product(s) described herein are free from patent, copyright, or intellectual property rights. Products described in this document are NOT intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. LuminentOIC customers using or selling products for use in such applications do so at their own risk and agree to fully defend and indemnify LuminentOIC for any damages resulting from such use or sale.

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PROVIDED ON AN "AS IS" BASIS. Customer agrees that LuminentOIC is not liable for any actual, consequential, exemplary, or other damages arising directly or indirectly from any use of the information contained in this document. Customer must contact LuminentOIC to obtain the latest version of this publication to verify, before placing any order, that the information contained herein is current.